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Review of the implementation of the recommendations and decisions adopted by the General Assembly at its tenth special session

Work of the Advisory Board on Disarmament Matters

Report of the Secretary-General

Summary

The Advisory Board on Disarmament Matters held its sixty-seventh session in Geneva from 25 to 27 January 2017 and its sixty-eighth session in New York, from 28 to 30 June 2017. During those sessions, it focused on the following substantive items on its agenda: (a) the threat of cyberattacks by terrorists on nuclear facilities and the potential role of cybermeans in threatening biosecurity; (b) the impact of artificial intelligence on international security; and (c) review of the implementation of the 34 recommendations contained in the 2002 United Nations study on disarmament and non-proliferation education (A/57/124) and, if necessary, arrangements for its revision, taking into account the latest experiences and new technologies in the area of education programmes.

On the cyberissue, the Board welcomes the establishment of the United Nations Office of Counter-Terrorism and recommends that it include in its remit the threat of cyberattacks by terrorists on nuclear facilities and on biofacilities. The Board endorses the idea of the United Nations becoming the key norm entrepreneur in the cyberrealm by involving all stakeholders, including States, international organizations, industry and civil society, in crafting the necessary international governance arrangements. The Board expresses its support for the Secretary-General's idea of forming a scientific advisory group to keep him informed of critical scientific and technical advancements that have security implications; they would include cyberdevelopments that have implications for nuclear security and biosecurity.

On nuclear security, the Board expresses its support for the central role of the International Atomic Energy Agency (IAEA) and calls for more attention and resources to be devoted to countering the cyberthreat to nuclear materials and installations. IAEA could, for instance, become the global repository of information on potential and failed threats against peaceful nuclear installations. The Agency

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could also expand the functions of its Incident and Emergency Centre to include cyber-related incidents or the threat of such incidents. With regard to biosecurity, the Board suggests that the Secretary-General seek the views of Member States regarding multilateral approaches to deal with the cyberthreat to biosecurity, given that no standing multilateral body is currently seized of the issue.

The Board strongly welcomes the attention that the Secretary-General has already given to artificial intelligence issues and urges the Secretary-General to continue to use every opportunity to bring the challenges and complexity of such issues to the notice of Member States. In addition, the Board proposes that interested Member States table a resolution during the seventy-second session of the First Committee of the General Assembly to seek the views of all Member States on the issue. The Board suggests that Member States consider commissioning the United Nations Institute for Disarmament Research (UNIDIR) to carry out a study, complemented by an expert panel, of the likely impact of artificial intelligence on international security (with the necessary funding allocated or identified in advance).

In its review of the recommendations contained in the 2002 United Nations study on disarmament and non-proliferation education, the Board concluded that the study remained relevant and comprehensive. The Board suggests that it be reissued with a new foreword by the Secretary-General and by the new High Representative for Disarmament Affairs. It should be distributed at all relevant United Nations gatherings. In view of the poor response of Member States to requests to report on their efforts in the field of disarmament and non-proliferation education, new methods need to be found to encourage a better response. Reporting should be made as technically easy as possible. Perhaps a renewed, urgent reminder to States would produce more responses, especially if done when announcing that the 2002 study is to be re-released. The Board commended the United Nations Office for Disarmament Affairs for its work in implementing the recommendations of the study and encouraged it to consider additional creative methods. They could include awards for best educators, journalists and writers in the field, the appointment of "peer ambassadors", seminars on best practice in disarmament education and online debates.

Serving as the Board of Trustees of UNIDIR, the Board approved the work plan and budget of the Institute for the period 2017-2018 and the submission to the General Assembly of the report of the Director of the Institute on its activities and financial status. The Board of Trustees expressed its gratitude to the Director and staff of UNIDIR for successfully managing the projects of the Institute. In that regard, the Board appreciates the Secretary-General's support for UNIDIR and hopes that he continues to support the ongoing efforts to secure its future.

I. Introduction

1. The Advisory Board on Disarmament Matters held its sixty-seventh session in Geneva from 25 to 27 January 2017 and its sixty-eighth session in New York from 28 to 30 June 2017. The present report is submitted pursuant to General Assembly resolution 38/183(O). The report of the Director of UNIDIR was approved by the Advisory Board serving as its Board of Trustees and has been submitted in document A/72/154.

2. Trevor Findlay (Australia) presided over both sessions of the Board in 2017.

3. The present report summarizes the deliberations of the Board during its two sessions and the specific recommendations conveyed to the Secretary-General.

II. Substantive discussions and recommendations

A. The threat of cyberattacks by terrorists on nuclear facilities and the potential role of cybermeans in threatening biosecurity

4. At its sixty-seventh and sixty-eighth sessions, the Advisory Board discussed the threat of cyberattacks by terrorists on nuclear facilities and the potential role of cybermeans in threatening biosecurity. To facilitate its discussion, the Board heard from outside experts: Caroline Baylon from the Center for Strategic Decision Research; Filippa Lentzos from King's College, London; Daniel Feakes from the Implementation Support Unit for the Biological Weapons Convention; and Lucas Kello from the Centre for Doctoral Training in Cyber Security at Oxford University.

5. The Board recognized that an emerging technology such as cyber cannot be controlled with traditional arms control tools or the existing disarmament machinery, owing to its often intangible nature, fast-paced evolution and the secrecy associated with its development. The difficulty of attributing responsibility and liability are also complicating factors that challenge traditional approaches.

6. The Board noted that there was a complicated debate as to whether a cyberattack constituted a war-like act or was a form of tolerated peaceful activity until it crossed a threshold, such as causing death and destruction. It was also noted that cyberattacks that sought to acquire information could be regarded as a form of espionage. Cyberattacks aimed at sabotage could be seen as entering a different realm, closer to war.

7. The Board noted with satisfaction that UNIDIR was preparing a mapping exercise on the various initiatives in the United Nations system on cyber- and international security. The Board requests that it be given the widest dissemination possible, including by the Office for Disarmament Affairs.

8. The Board identified several parallels between nuclear security and biosecurity in the cyberdomain, including the following:

(a) Both require more than traditional physical security and protection ("guards, gates and guns") as well as security of information;

(b) Both confront the myth of the "air gap" (the physical separation of facility systems from the Internet), as providing the ultimate security (USBs and personal devices are among the potential cyberattack pathways);

(c) Both face supply chain vulnerabilities (supplies, components and maintenance may introduce cyberrisks);

(d) Both face so-called insider threats, whereby rogue employees may seek to purloin information or sabotage a plant;

(e) Both need to pay attention to cyberculture and cyberhealth and bridge differences in approach between operators and information technology specialists;

(f) At the national level, the means for strengthening cybersecurity tend to be the same: norms, standards, national legislation, regulations, education and training and the involvement of all stakeholders, including industry;

(g) Internationally, the solutions also tend to be similar: promulgation and promotion of internationally acceptable norms and standards, awareness-raising, education and training (developing countries are particularly in need of capacity-building and assistance).

9. However, there are some major differences between the two fields, as revealed in the expert presentations and Board discussion.

Cyber- and nuclear security

10. Compared to the biosecurity field, the Board recognized that the nuclear security field was replete with organizations, treaties, arrangements and initiatives that have begun to focus on the threat to nuclear facilities from cyberattacks.

11. IAEA plays a central role in multilateral cooperation on nuclear security, including in the cyberrealm.

12. The Board acknowledged the Ministerial Declaration of the International Conference on Nuclear Security of 5 December 2016 in which the participants endorsed the core nuclear security activities undertaken by IAEA whereby it assists States, upon request, in their efforts to establish effective and sustainable national nuclear security regimes, including providing guidance development, advisory services and capacity-building. The Board supports the efforts of IAEA to assist Member States to strengthen computer security to deal with terrorist attacks on nuclear facilities.[1] The Board noted the possibility of trust- and confidence-building measures in the realm of cyber and nuclear security.

13. The Board also noted that the new Nuclear Industry Steering Group for Security has launched a cyber working group that may produce recommendations on cybersecurity measures from an industry perspective.

Cyber- and biosecurity

14. Biosecurity is quite different to nuclear security, both in terms of the cyberthreat and the means to tackle it. One of the revelations of the expert presentations was that, unlike a cyberattack on a nuclear facility, which may have results that are the equivalent of a radiological weapon attack, it is apparently hard for experts to envisage how a cyberattack on a biological facility could cause the release of harmful pathogens into the environment to create the equivalent of a biological weapon attack. Pathogens are required to be stored in secure freezers according to international standards and it is difficult to envisage a mechanism for them being maliciously opened by cyber means. Although there are no "formulas" for bioweapons to be stolen (like chemical formulas for chemical weapons), stealing information is one potential aim of a cyberattack. The biggest concern with biosecurity is apparently that hackers might compromise the access codes and logs of a bio facility to gain information that could be exploited outside the laboratory by

[1] See www.iaea.org/sites/default/files/16/12/english_ministerial_declaration.pdf.

highly trained personnel to reproduce the research it has carried out. Another threat to biofacilities is sabotage or other malicious damage, including by terrorists.

15. Unlike nuclear weapons, biological weapons would not be predeployed on launch vehicles but only weaponized prior to use. The source materials, living pathogens, are therefore not prepared in bulk in advance but grown when required. This means that a cyberattack cannot cause a bioweapon to launch. Indeed, with wide adherence to the Biological Weapons Convention, there should be no biological weapons in existence. The Convention does not, however, have a monitoring or verification organization, so there is no body responsible for cyberterrorism as it relates to biosecurity. The confidence-building transparency measures agreed by States parties do not have a cyberthreat element and the treaty's Implementation Support Unit does not have the resources to follow cyberthreat developments. There is thus currently no institutional home in the United Nations system for the cyber- and biosecurity nexus, unlike the IAEA in respect of nuclear security.

16. **The Board makes the following recommendations:**

General

(a) **The Board welcomes the establishment of the United Nations Office of Counter-Terrorism and recommends that it include in its remit the threat of cyberattacks by terrorists on nuclear facilities and on bio-facilities;**

(b) **The Board endorses the idea of the United Nations becoming the key norm entrepreneur in the cyberrealm by seizing the opportunity to involve all the stakeholders in crafting the necessary international governance arrangements, including States, international organizations, industry and civil society;**

(c) **The Board expresses its support for the Secretary-General's idea of forming a scientific advisory group to keep him informed of critical scientific and technical advancements that have security implications. That would include cyberdevelopments that have implications for nuclear security and biosecurity;**

Nuclear security

(d) **The Board supports the central role of IAEA in nuclear security and calls for more attention and resources to be devoted to countering the cyberthreat to nuclear materials and installations. IAEA could, for instance, become the global repository of information on potential and failed threats against peaceful nuclear installations. It could also expand the functions of its Incident and Emergency Centre to include cyber-related incidents or the threat of such incidents;**

Biosecurity

(e) **The Board suggested that the Secretary-General seek the views of Member States on the multilateral approaches that might be taken to deal with the cyber threat to biosecurity, given that no standing multilateral body is currently seized of the issue.**

B. The impact of artificial intelligence on international security

17. The Board welcomed the addition of this new topic, a "frontier" issue which has many dimensions — political, legal, technical, social and ethical — that are

confronting the international community and which may have revolutionary effects on international security. Both threats and opportunities need to be considered.

18. The Board recognizes that its own expertise on this issue, as for most United Nations institutions, is limited. It is therefore seeking to educate and inform itself as quickly as possible, especially to avoid making proposals that "reinvent the wheel". To that end the Board received a briefing at its January session from Stuart Russell, Professor of Electrical Engineering and Computer Sciences at the University of California at Berkeley, one of the leading experts in the field.

19. In June the Board was briefed by Elena Tomuta of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization on the use of artificial intelligence to facilitate the detection of nuclear explosions, both in regard to seismic monitoring and on-site inspection. This is an impressive example of the use of artificial intelligence "for good". The Board also asked IAEA to brief it on the use of artificial intelligence in nuclear safeguards but the Agency regrettably declined. The Board expressed its desire for a briefing from IAEA at its next session. In addition, Robert Fitzpatrick and Daniel Pedraza of United Nations Global Pulse provided a briefing on the use of big data to help implement the Sustainable Development Goals. They also speculated on the potential uses of big data in the disarmament realm. Food-for-thought papers were provided by Board members Choi Sung-joo and Pervez Hoodbhoy.

20. In addition, the Board had before it governmental reports, expert studies, including a series of excellent studies done by UNIDIR, and documentation on lethal autonomous weapons systems under the Convention on Certain Conventional Weapons. Lethal autonomous weapons systems are clearly a subset of the broader issue of artificial intelligence and its implications for international security. The Board's agenda item on cyber threats is also relevant.

21. In its initial foray into the subject, Board members made preliminary observations which may guide its future work:

(a) Artificial intelligence can benefit international security, as well as threatening it. The Board identified, for instance, the potential utility of artificial intelligence in monitoring, verification and compliance in respect of arms control and disarmament agreements. Benefits include reducing costs and increasing efficiency of implementation.

(b) Contrary to initial impressions that industry is setting the pace for policy development in this field, it is clear that industry is looking to multilateral institutions to help guide it in norm-building and other governance aspects. One example is the recent "AI for good" Summit organized by the International Telecommunication Union in collaboration with the XPRIZE Foundation. The United Nations system should seize this opportunity: it is in an excellent position to bring together the various stakeholders, including governments, international organizations, industry and civil society.

(c) United Nations Global Pulse has demonstrated that artificial intelligence can be used to help implement the Sustainable Development Goals using innovative, iterative and experimental "laboratories" that focus not just on technical solutions, but on policy and ethical implications such as privacy concerns. The Board sees a possibility, in pursuit of Goal 16 on peace, justice and strong institutions, to follow a similar approach in respect of international security issues, notably disarmament and arms control. It proposes to give further consideration to how this might be implemented.

(d) While many implications of artificial intelligence for international security are as yet uncertain, one that is already apparent is the use of autonomous

or semi-autonomous weapons systems and other uses of robots in warfare. The Board acknowledged the work of civil society and the scientific community in raising awareness of the artificial intelligence issue;

(e) Regardless of the particularities of the use of artificial intelligence in warfare, international humanitarian law should prevail at all times. International human rights law should also be taken into account;

(f) The United Nations has a golden opportunity to provide the international security context and framework for developments in artificial intelligence, if it moves quickly. The Board will give closer consideration to this issue if requested.

22. **The Board makes the following recommendations:**

(a) Conscious of the complexity and novelty of this "frontier" issue, the Board recommends that artificial intelligence remain on its agenda for the next session;

(b) The Board identified particular aspects of artificial intelligence to be considered in its further work:

(i) Given the current level of definitional fluidity and confusion about artificial intelligence, the Board saw value in gathering definitions and considering which best fits the international security field;

(ii) Having identified the "human in the loop/on the loop" as a crucial threshold issue for thinking about artificial intelligence, Board members expressed the strong view that machines should not be permitted to make decisions to target or kill humans. Regarding proposals that the United Nations adopt outright a "ban on offensive autonomous weapons beyond meaningful human control", exactly how such a ban might be agreed internationally should be examined by the Board at its next meeting. The implications for both offensive and defensive systems need to be considered;

(iii) Additional specific issues that should be tackled by the Board include: intangible technology transfers and the lack of international regulatory standards or structures for dealing with them; and the possibility of export control regimes (3D printing is seen as having particular implications for weapons proliferation);

(iv) The need to enhance capacity-building, awareness-raising, training and information-sharing on best practices and lessons-learned;

(c) The Board strongly welcomes the attention that the Secretary-General has already given to the artificial intelligence issue and urges him to continue to use every opportunity to bring the challenges and complexity of the artificial intelligence issue to the attention of Member States;

(d) To encourage Member States to begin paying attention to the implications of artificial intelligence and international security, the Board proposed that interested Member States table a resolution during the seventy-second session of the First Committee of the General Assembly to seek the views of all Member States on the issue. The Board suggested that Member States consider commissioning UNIDIR to carry out a study, complemented by an expert panel, of the likely impact of artificial intelligence on international security (with the necessary funding allocated or identified in advance). The UNIDIR study could be funded through voluntary contributions or in accordance with article VII.3 of its Statute on regular funding for specific

activities mandated by the General Assembly. UNIDIR is requested to provide a preliminary draft estimate of the cost of such a study.

C. Review of the implementation of the 34 recommendations contained in the 2002 United Nations study on disarmament and non-proliferation education and, if necessary, arrangements for its revision, taking into account the latest experiences and new technologies in the area of education programmes

23. In the 2002 study on disarmament and non-proliferation education (A/57/124) the Board is encouraged "to consider periodically follow-up action related to disarmament and non-proliferation education".[2] The most recent consideration by the Board was in 2010.[3]

24. To facilitate its discussion on this occasion, the Board considered a food-for-thought paper by Board member Vladimir Orlov, who was part of the group that produced the original study in 2002. He provided an overview of the 34 recommendations and the need for follow-up at this juncture. The Board also had the benefit of a presentation by Dimitri Nikonov of IAEA on the innovative International Nuclear Security Education Network, which could serve as a model for disarmament education. The Board was also briefed by John Ennis of the United Nations Office for Disarmament Affairs and Kate Dewes of the New Zealand Disarmament and Security Centre.

25. The Board is of the view that while certain elements of disarmament education have to be strengthened, there is no need for a new study, as the 2002 study remains relevant and comprehensive. Rather, the focus should be on further and full implementation of the 34 recommendations it contains.

26. The Board stresses the need to put disarmament into the context of international security. Measuring the impact of disarmament education, through both qualitative and quantitative metrics is currently often neglected. Even if impact can be difficult to measure, attempts should always be made to do so.

27. The Board expressed concern that disarmament education is of decreasing interest among the younger generation. Even among senior policymakers there can be a lack of awareness and knowledge. People in different parts of the world have different perspectives on the disarmament agenda, different priorities (for example nuclear versus conventional disarmament) and different educational styles. Disarmament education therefore needs to be tailored to different generations, States, regions and cultures.

28. The Board strongly stressed the need for education materials on disarmament and non-proliferation to be translated into all six official languages of the United Nations. Easier and more cost-effective ways need to be found to do so.[4] The Disarmament Information Programme run by the Office for Disarmament Affairs has demonstrated some possibilities. Automatic translation technology may one day provide a cheap and easy method of translation but is not quite ready yet.

29. The Board also stressed that it was vital for journalists and media representatives to enhance their knowledge of disarmament and non-proliferation.

[2] See A/57/124, recommendation 30.

[3] A/65/228.

[4] In support of this position the Board referenced General Assembly resolution 69/324 of 21 September 2015 on multilingualism.

That applied, in particular, to the digital media, which plays an increasingly important role today.

30. It was also vital to "educate the educators" at the national, regional and international levels in order to achieve a multiplier effect.

31. **The Board makes the following recommendations:**

(a) **The 2002 study on disarmament and non-proliferation education remains relevant and comprehensive in its coverage. The Board suggests that it be reissued with a new foreword by the Secretary-General and by the new High Representative for Disarmament Affairs. It should be distributed at all relevant United Nations gatherings;**

(b) **In view of the poor response of Member States to requests to report on their efforts in the field of disarmament and non-proliferation education, new methods need to be found to encourage a better response. Reporting should be made as easy as possible technically. Perhaps a renewed, urgent reminder to States might produce more responses, especially if done when announcing that the 2002 study will be re-released;**

(c) **The Board commended the Office for Disarmament Affairs for its work on furthering the recommendations in the 2002 study and proposed that it consider additional creative means of advancing disarmament education. That could include awards for best educators, journalists and writers in the field, the appointment of "peer ambassadors", seminars on best practices in disarmament education and the launching of online debates.**

III. Board of Trustees of the United Nations Institute for Disarmament Research

32. The Advisory Board on Disarmament Matters, acting in its role as the Board of Trustees for UNIDIR, held two meetings during the year, on 25 January in Geneva and on 28 June in New York.

33. The January meeting was devoted to an extensive briefing by the Director and staff of UNIDIR on the current status and activities. The Board welcomed the Director's message that the crisis period was over, the Institute having weathered the change management process, a financial crisis and the introduction of Umoja and International Public Sector Accounting Standards. The Director laid out several continuing challenges:

(a) Sustaining and growing institutional capacity and funding;

(b) Improving outreach and visibility;

(c) Preparing for the 2018 independent third party assessment;

(d) Expanding partnerships with other entities, both within the United Nations system and externally.

34. The Board recommended that with many of the immediate challenges to the future of UNIDIR now resolved, efforts should be made to strengthen the relationship between it and the Board, including raising the profile of the Board in its statutory role as the governing body of the Institute and having it take better advantage of UNIDIR research outputs. Several reforms were progressively implemented during the year.

35. At its meeting in June, the Board was given an update by the Director on the status and activities of the Institute. It approved the report of the Director on the

activities of the Institute for the period from January to December 2016 and the proposed programme of work and financial plan for 2017 and 2018 (A/72/154).

36. The Board was impressed by the sheer number of projects and activities undertaken by the Institute over the past year and the quality of its research output. It expressed its gratitude to the Director and staff for successfully managing the substantive work of the Institute. The Board especially appreciated the steps taken by the Institute to enhance its communications and outreach by launching "UNIDIR updates", engaging with social media and employing two part-time consultants.

37. On the question of funding, the Board expressed its satisfaction with the continuing success of the Director and UNIDIR staff in raising project funding, including from private philanthropic sources, as well as Member States.

38. As required by the UNIDIR Statute, the Board considered the question of the subvention from the regular budget of the United Nations for UNIDIR and strongly recommended that it be approved. It also strongly supported a one-off increase in the regular budget subvention for the biennium 2018-2019, as recommended in General Assembly resolution 70/69 on the thirty-fifth anniversary of UNIDIR. The Board noted that this resolution had been adopted by consensus.

39. The Board reiterated its previous conviction, as recommended in the 2015 internal review (the Bowen report), that the minimum institutional structure for UNDIR should be five posts (see A/70/186, para. 44). In order to ensure the operational sustainability and independence of the Institute, the annual subvention should be increased to cover the costs of all the institutional staff, including the position of Chief of Research, which would further strengthen research design and integrity.

40. The Board looked forward to the independent third-party assessment of UNIDIR, expected to be carried out in early 2018, to be followed by a report of the Secretary-General. The Board stressed that the sustainable and stable funding structure and operating model outlined in the report of the Secretary-General must respect the mandate and objectives of the Institute, as contained in the UNIDIR Statute. It reiterated its call to the Director of UNIDIR to begin preparing metrics on the performance of the Institute to inform the independent assessment. The Board expressed its wish to be consulted by the external assessor when it meets in January 2018 in Geneva, as well as having the opportunity to provide inputs into the draft assessment prior to its submission to the Secretary-General. The Board expressed the hope that the sustainable and stable funding structure and operating model for the Institute that the third-party assessment will consider will also address the need for an increased regular budget subvention.

41. Finally, the Board of Trustees looked forward to the decision on the UNIDIR directorship and urged that this be resolved as soon as feasible to contribute further to the stability of the Institute.

IV. Future work and other matters

42. To set its future work in context, the Board agreed to hold a general debate on the international security situation at the beginning of each of its meetings.

43. As to future topics, the Board suggested that it be given only two substantive topics each year to permit more thorough consideration of each one. It strongly recommended that one of its current agenda items, "Artificial intelligence and international security", remain on the agenda for at least another year.

44. In order to facilitate its consideration of a new agenda item, the Board would welcome a brief explanation from the Secretariat of the rationale behind the selection of the item.

45. To further assist the Board in ensuring continuity of its work, it would welcome the appointment of its Chair for a two-year term, rather than one year, as is the current practice. The Board would also welcome an early announcement of the appointment of the Chair, well before the its first annual meeting in January, to ensure a smooth leadership transition. Ideally, the Chair should be a member who has served for at least one year, so that he or she is familiar with the operation of the Board. After a two-year term as Chair he or she would remain on the Board for another year to assist and advise the new Chair.

46. In view of the recent expansion of the Board agenda to include items relating to international security generally, in particular the impact of emerging technologies, the Board agreed to craft a vision statement for consideration at its next meeting.

Annex

Members of the Advisory Board on Disarmament Matters 2017

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